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Latex and textiles

19.1 INTRODUCTION

The purpose of this chapter is to review those processes using polymer latices which result in the formation of textile–polymer combinations of one kind or another. Aside from this general uniting theme, the various applications to be considered are rather diverse. Some of the processes noted are of comparatively little industrial importance now.

In the first instance, there is the process of latex spreading, in which the objective is to form a coherent, impervious film of polymer over one surface of a textile fabric. Closely allied are the processes known respectively as textile combining and textile doubling. In both, the objective is to bond two or more layers of textile fabric together by means of a polymer adhesive. By textile combining is meant the operation of coating a fabric with a film of adhesive compound, and then bonding the fabric to a second fabric in a continuous process. Textile doubling, on the other hand, is the operation of bonding a textile fabric to another fabric which has previously been coated with an adhesive. It differs from combining in that it is a discontinuous process.

A latex–textile application which has become very important in recent years is that of the bonding of non-woven fabrics. In this application also, the polymer phase of the latex is used as an adhesive. The function of the polymer phase is to bond together a loose web of fibres into a coherent whole. The latex polymer is not present as a continuous film extending throughout the entirety of the bonded fibres; rather, it is present as isolated droplets which should, of course, be coherent and continuous within themselves.

Another applicational area for latices in connection with textiles which has become very important in recent years is that of carpet-backing. In this application, yet again the polymer phase of the latex is used as an adhesive. In this case, the polymer phase of the latex anchors the fibres of a non-woven carpet into a suitable backing material. Latices find other applications in connection with carpets. Thus they are used in the manufacture of two types of carpet underlay material, namely, latex foam rubber underlay and bound-crumb underlay. Underlay of the latex foam rubber type can either be separate from
the carpet, or it can form an integral bottom layer to the carpet. In the latter case, the foam is applied to the base of the carpet by spreading. In particular, this technique has been used in connection with non-woven fabrics which have been backed with the aid of a latex adhesive.

Latices can also be used in various processes for impregnating textiles. In these, the objective is to cause the latex polymer to penetrate a pre-existent textile structure in such a way as to enhance properties such as crease-resistance, resilience, wet-strength, etc. The use of reverse-charge latices of the positek type has been of some interest in this connection.

It will be evident from the foregoing remarks that in several applications the latex component of the latex–textile combination functions as an adhesive for textile fibres of one or several types. There is therefore considerable overlap between the subject matter of this chapter and that of Chapter 22, in which latex-based adhesives are reviewed. To some extent, the apportionment of the various topics between these two chapters is arbitrary. The guiding principle has been that the present chapter deals with applications in which the principal component of the end-product is textile fibres in one form or another. In particular, it should be noted that one important application of latices in connection with textiles has been omitted from this chapter; this is the use of latex systems as rubber-to-textile bonding agents. This matter is considered in section 22.5 of Chapter 22. It is also evident that, in some applications, the latex can be regarded as providing a surface coating for a textile fabric. To this extent, it might be thought that there is some overlap between the topics dealt with in this chapter and the subject matter of Chapter 20, which reviews latex-based surface coating compositions. However, the overlap is more apparent than real, in that polymer surface coatings applied to textile fabrics are usually much thicker than those which are applied to solid substrates, and the functions of the surface coatings differ considerably in the two types of application.

There appear to be few publications which deal comprehensively with latex–textile treatments as a unified subject. An early publication is a booklet by Blow [1]. This deals specifically with several aspects of the application of natural rubber latex to textile fibres in various forms. More recently, a review of applications of synthetic latices as binders for textile fibres has been given in a chapter by Charlton, Bowden and Smith [2]. A review of the uses of rubber latices in carpet manufacture has been given by Porter [3] in the same book. Warson [4] has given an extensive review of miscellaneous textile applications of resin latices. Various references to textiles are to be found scattered in the book on latex technology by Athey [5]. Brief reference to fabric coatings based specifically upon styrene–butadiene rubber latex and upon polychloroprene rubber latex will be found in a report by Head [6] and in the book by Carl [7] respectively. A paper by Nuessle [8] reviews textile applications of latices of acrylic polymers. A series of booklets published by Revertex [9–13] provides a useful introduction to the application